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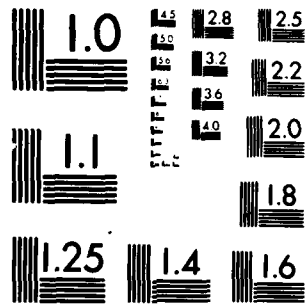
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The failure to achieve complete mandibular anesthesia is a problem that occurs in as high as 20% of all cases. The explanations vary from faulty anesthetic solutions to faulty technique, to anatomic or physiologic variations. Accessory nerve innervation from the mylohyoid nerve or the contra-lateral mental nerve has also been suggested. Bifurcation of the mandibular nerve is rarely mentioned in the literature, but may be a cause for inadequate anesthesia in some small percentage of cases.

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A bifid mandibular nerve as a possible cause of  
anesthetic deficiency in the mandible

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## INTRODUCTORY SUMMARY

The failure to achieve complete mandibular anesthesia is a problem that occurs in as high as 20% of all cases.<sup>6</sup> The explanations vary from faulty anesthetic solutions to faulty technique, to anatomic or physiologic variations. Accessory nerve innervation from the mylohyoid nerve or the contra-lateral mental nerve has also been suggested. Bifurcation of the mandibular nerve is rarely mentioned in the literature, but may be a cause for inadequate anesthesia in some small percentage of cases.

## INTRODUCTION

Pain control is an essential requirement for most dental procedures. The problem of inadequate anesthesia is often encountered during attempts at inferior alveolar nerve block. A radiographic image of the mandibular canal usually is readily seen on a panoramic radiograph. A periapical radiograph of the second molar area may show a part of the canal's image. This canal usually appears as a horizontal linear radiolucent band with definite borders of two radiopaque lines.<sup>1,2</sup>

The traditional method of achieving anesthesia in the mandible is with a block of the mandibular branch of the trigeminal nerve before it enters the mandible just posterior to the lingula.<sup>4</sup> Some attention has been paid to anatomic variation and the possible role of branches from the mylohyoid nerve.<sup>5</sup> Variations in innervation due to innervation from the posterior-superior alveolar, auricula-temporal, or lingual branches of the temporomandibular nerve or the facial nerve have also been cited.<sup>3,4,6</sup> One source<sup>7</sup> reported the aberrant retro-molar branch of the mandibular nerve which may innervate the mandibular third molar. Various additional injection sites have been suggested: buccal or sublingual injections,<sup>5</sup> alternate block techniques,<sup>8,9</sup> and periodontal ligament injections.<sup>10</sup>

Slight attention has focused on the possibility of a bifid mandibular nerve and the possible consequences of an inferior second mandibular foramen. This may not be anesthetized by traditional block or auxiliary injection techniques.

Nortje *et al.*<sup>12</sup> conducted a panoramic radiographic survey of 3,612 patients and concluded that there are three different patterns of duplication or division of the mandibular canal. They reported that such bifurcation occurred in 33 individuals (0.9 percent). Twenty cases were bilateral bifurcations and 13 were unilateral.

Mandibular canals are usually bilaterally symmetrical.<sup>6</sup> On occasions a bifurcation may exist and can be recognized by a panoramic radiograph. This report reviews the incidence of bifurcation of the inferior alveolar nerve and presents four cases seen during a routine panoramic radiographic survey.

#### MATERIAL AND METHOD

A panoramic radiographic survey of 5,000 U. S. Army recruits, age 17-26, was taken to determine their oral health status.<sup>15</sup> Four cases, highly suggestive of bifurcation of the inferior alveolar nerves, were noticed (an incidence of 0.08 percent). These four cases included one case where bifurcation seems to be bilateral.

#### CASE 1:

An 18-year-old male came to the dental clinic for the treatment of pericoronar infection around third molars. History of prior dental treatment was absent. A panoramic radiograph revealed bifurcation of the right inferior alveolar nerve ascending at the mandibular foramen. Two distinct radiolucent lines outlined by radiopacities can be seen on the panoramic radiograph (Fig. 1).



## CASE 2:

A 22-year-old male was seen for routine care. A panoramic radiograph revealed bifurcation of the left inferior alveolar nerve. The superior division seen to bifurcate at a midpoint of the body of the ramus. Patient's history of anesthesia during dental treatment was inconclusive (Fig. II).

## CASE 3:

A 20-year-old male presented at the clinic for treatment of pericoronal infection around the third molars. A panoramic radiograph revealed a radiolucency on left ascending ramus highly suggestive of bifurcation of inferior alveolar nerve. In this case, the inferior branch seems to further bifurcate posterior-inferior to the third molar roots (Fig. III). No history of anesthetic difficulty was given.

## CASE 4:

A 19-year-old male came into the dental clinic for a routine checkup. A panoramic radiograph revealed radiolucency indicative of bifid nerves in both rami nerves. No attempt was made to establish any relation between this occurrence and profoundness of anesthesia (Fig. IV).

## DISCUSSION

Patterson and Funke<sup>13</sup> reported on case of bifid inferior alveolar canal and pointed out that the dental literature including standard anatomy texts have little information on the incidence of such a rare entity. According to Nortje,<sup>12</sup> this is, after all, not a rare finding.

Sutton,<sup>14</sup> in his study, pointed out the practical significance of mandibular accessory foramina. He conducted his study on 300 human mandibles employing various techniques, such as dissection, radiographic interpretation, and histological examination to demonstrate the presence of a number of accessory foramina containing nerve fibers. Certain pathological conditions of the mandible and their possible influence on the radiographic appearance of the inferior dental canal have been reported by Farman.<sup>16</sup> However, neither of the studies<sup>14,16</sup> encountered the bifid inferior alveolar nerve.

Various modified techniques have been reported to obtain inferior alveolar nerve block claiming high success rate.<sup>8,9</sup> Even a supplemental periodontal ligament injection<sup>10</sup> has been suggested to achieve adequate pulpal anesthesia in addition to standard injection. Some anatomical and physiological causes of failure to achieve mandibular analgesia has been discussed.<sup>11</sup> But little information is available on failure to achieve profound anesthesia due to bifurcation of inferior alveolar nerve by a routine block.

Mandibular canals are usually bilaterally symmetrical. On occasions a bifurcation may exist that can easily be recognized by a panoramic radiography.<sup>12,15</sup> This report indicated an incidence of 0.08 percent that seemed very low as compared to Nortje's observation

In situations where bifid canals are recognized and the possibility of a second, more inferiorly placed foramen exists, alternate sites for placement of the anesthetic solution should be considered if routine

attempts to achieve total anesthesia are not successful. In cases where a second mandibular foramen is possibly present, deposition of the anesthetic solution inferiorly to the normal anatomic landmarks may provide more complete anesthesia.

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# LEGEND

- Figure 1    Bifurcation of the right inferior alveolar nerve.
- Figure 2    A bifid left inferior alveolar nerve and its bifurcated superior division.
- Figure 3    The bifurcation of the inferior division of the left inferior alveolar nerve.
- Figure 4    Bilateral bifurcation of the inferior alveolar nerves.

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